Future Force Warrior ATD Program Overview

Carol J. Fitzgerald
Future Force Warrior Technology Program Manager
Natick Soldier Center (Duty Station: PEO Soldier)

The Future Force Warrior (FFW) ATD

- **Integration program structured to leverage cutting edge technologies**
  - **Currently in S&T phase**
- **System of Systems concept maximizing effectiveness of small combat unit (SCU) operations**
- **Interoperable with Future Combat System**
- **Early design phase for LW III/ Ground Soldier**

A Revolutionary capability for the Future Force

FFW ATD End State*

How we Define Success within LTI budget ($161M) and schedule (6/12/03 to 9/30/07):

1. Integrate & demonstrate System of Systems technologies for the 'Core' Soldier and the Ground Soldier and develop candidate warfighting concepts for TRADOC approval that substantially increase the combat effectiveness of Soldiers in small combat units within an FCS-equipped UA for transition to LW III
2. Identify and transition mature technologies for insertion into LW II(SI) prior to ATD completion
3. Develop an analysis of variants based system design concept for the remaining four variants of the SaaS (mounted, air, maneuver sustainment and maneuver support); subject to availability of funds and time, integrate and demonstrate SoS technologies for each variant

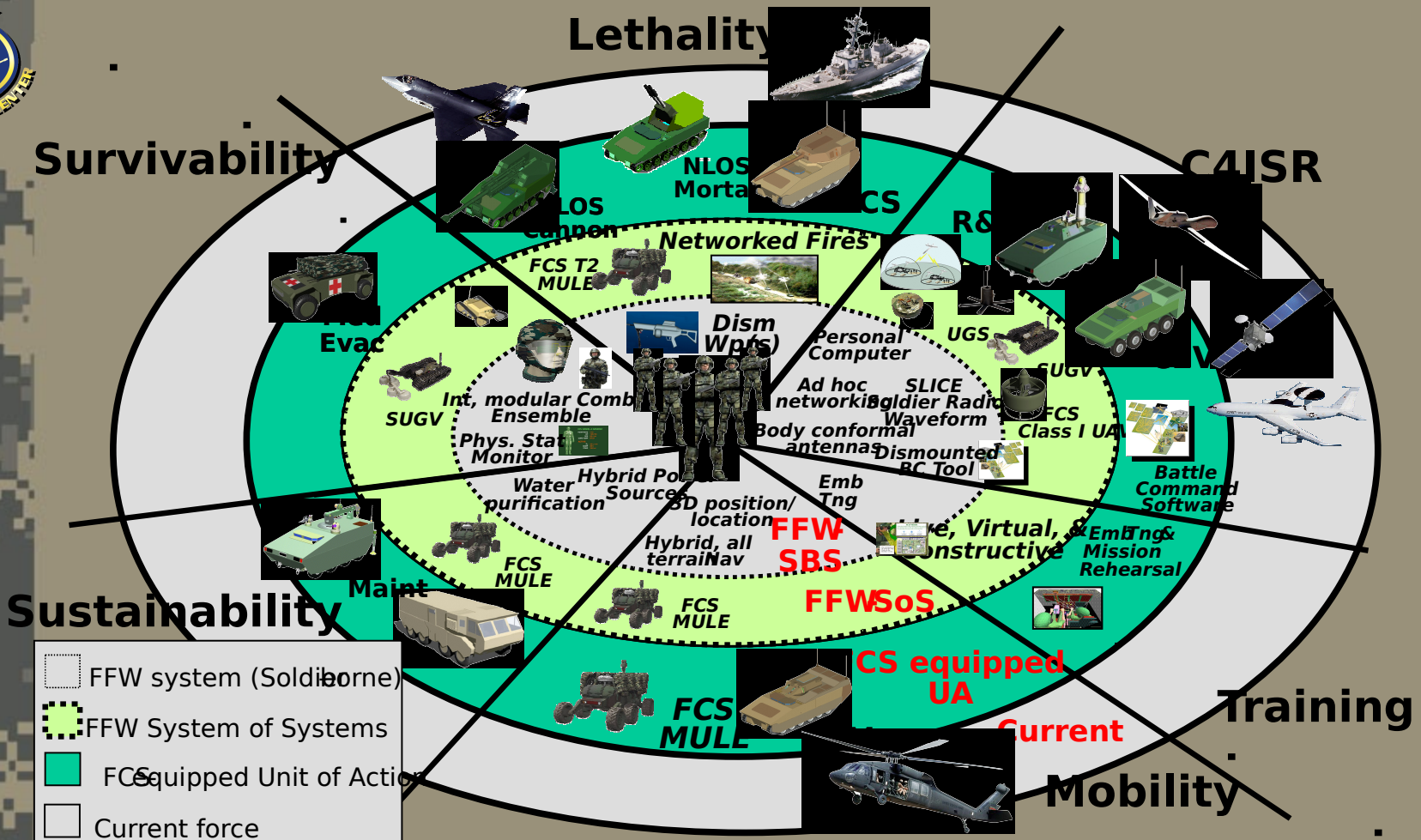
FFW Imperatives

- **Integrated C4ISR and netted fires for small combat unit with real time linkages to UA and joint networks**
- **24 hour autonomous mission duration capability for small team ops**
- **Weight reduction to 50 pounds average fighting load per Soldier**
- **Deliberate and iterative development of small combat unit requirements based on sound analysis, technology exploration, experimentation and assessment with users in relevant operational environments**
  - Approved Capability Development Document (CDD) prior to ATD completion to support transition to PEO Soldier
  - ATD continuously contributes to the refinement and validation of Ground Soldier System CDD requirements
  - Embodies the “Soldier as a System” concept

FFW Hallmarks

- **Holistic, Soldier-centric & network enabled, System of Systems approach**
  - Maximize human performance, Soldier acceptability & utility
  - Emphasize collective small combat unit capability
- **Open systems architecture for:**
  - Spiral integration of future technologies
  - Modular reconfiguration for all Soldiers in the Future Force
  - Life cycle cost considerations, second sourcing, maintaining competition
- **Deliberate, spiral development of small team <u>requirements</u>**
  - Develop new TTPs based on technology innovations - unconstrained by existing formations and doctrine
  - Approved CDD at conclusion of ATD
  - Streamline transition to acquisition phase
- **Continuous user involvement and experimentation using prototypes and surrogate systems where necessary**

FFW SoS Concept within the Unit of Action



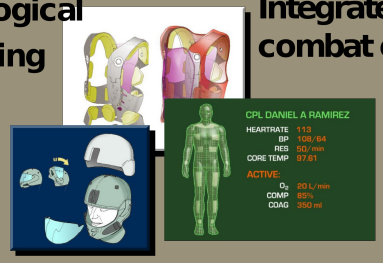
FFW SoS Capabilities for FY07 Demonstration

Enhanced triage, improved Soldier performance

Reduced weight fighting load; improved mobility, fightability; enhanced protection

Mission-ready Soldiers via embedded training & collaborative planning

Physiological monitoring



Integrated, modular, tailorable combat ensemble & helmet

Training and leader development

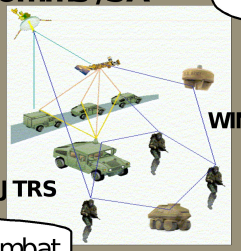
Increased lethality and area of influence via enhanced SA, networking, ISR and tactical maneuver

Soldier robotics and interface with FCS robotic platforms

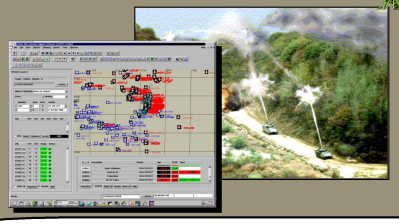
Lightweight hybrid power System & power mgt

Improved mobility for small combat unit; extended mission duration & sustainment

Netted comms /SA



Small combat unit info dominance w/superior SA/UDOP, synchronized platoon combat power; faster decision cycles, optempo



Netted fires

Longer mission duration w/o resupply

Networked effects tools to manage, integrate & synchronize combat power w/FCS and joint fires; cooperative engagement within SCU

Demonstrate *REVOLUTIONARY* Soldier and Small Teams capability through integrated system of systems approach

FFW ATD Capabilities Anticipated for FY07 Experiments & Demos

Network digital radio
- JTRS Cluster V surrogate (SLICE surrogate HW With Soldier Radio Waveform (SRW))
- Digital ad hoc (self re-routing) networking
- Cross-domain solution (multiple security levels)
- Body conformal antenna
- Soldier-centric design

Personal navigation
- Personal navigation
- . Hybrid 3D all-terrain navigation
- . GPS, DRM & IMU
- . Kalman filter

Situational Awareness
- Seamless integration of LW net with FCS network and unattended or autonomous sensors Warrior team collaborative planning and mapping
- Horizontal data fusion within squad
- Multiple I/Os (wrist, helmet mounted, tablet)

Direct & area fire weapons
- M4/ XM-8
- Lightweight machine gun w/lightweight ammo

Fire control systems
- Long range fire control with multifunction laser, med range uncooled thermal sight and I² camera. Modular upgrade for sensor fusion
- Short Range fire control with laser rangefinder, short range uncooled thermal sight, and direct view optic

Organic supporting fires & synchronization
- Target geo-location and digital call for effects
- Near real time access to FCS fires

Helmet-mounted sensors
- Helmet mtd sensors (Thermal, I², fused, SWIR demo
- See-thru, color, high resolution, monocular HMD
- Embedded training laser sensor (InGaAs)

Headgear protection and integration
- Improved weight, ergonomics and center of gravity
- Integrated/modular design compatible w/XM50 mas for respiratory protection with mission-specific PAPR
- Lightweight protection from fragment and 9mm
- Ballistic and laser eye protection (3 lines)
- Hearing protection and integrated comms
- Improved suspension liner

Leveraged FCS Unmanned Systems
- Common operator control unit (Goal: integrated Soldier control unit

Robotic mule
- Load carriage, power generation
- Mobile squad-based fusion station

Small organic Unmanned Ground Vehic
- Modular sensor suite payloads

Organic Unmanned Air Vehicle
- One man portable
- 0.5 – 2 lb payload
- 8 (T) – 16 (O) km range
- Real time day/night video and comms

FFW ATD Capabilities Anticipated for FY07 Experiments & Demos

Rechargeable battery
- Lithium Ion, ~200 Wh/kg

Hybrid energy sources
- Zn-air systems, ~360 Wh/kg mission extender
- Methanol fuel cell, 20 watt mission extender demo

Power architecture
Semi-distributed power architecture (mission critical Groupings)

Power management
- Low power processing
- Efficient SW architectures
- Automated/selective device powering

Integrated combat suit
- Modular, integrated design body armor/load carriage chassis with ltwt, high performance ballistic materials
- Integrated joint protection
- Multifunctional materials including:
  - SPM for CB protection
  - Hybrid Electro-textile power/data PAN
  - Novel signature mgmt (multi-environment visual and near/far IR)
  - Moisture management FR materials

Thermal balance
- Passive thermal management via spacer materia and highly wicking materials
- Personal Air Ventilation System (PAV)

Prompt casualty care
- Improved self/buddy aid first aid kit
- Improved treatment aids (dressings, positionable tourniquets)
- Integrated Medic and CLS load carriage/aid bag

Training
- Live, constructive, virtual links
- TTP recall; Manuals, reference access
- Leader training
- Collaborative en route planning and mission rehearsal
- Embedded laser training sensors

Human Performance
- System fightability (physical, cognitive)
- Physical/cognitive performance enhancement
- Multi-modal input/output devices
- Nutritional Supplement performance enhancers

Sustenance
- First Strike Ration
- Self-Hydrating Ration

Remote physiological monitoring
- Force health readiness monitoring and automated casualty detection
- Remote triage prioritization information
- Electronic medical data capture

Hydration
- On the move hydration w/CB protection and water purification

Major areas of FFW capability growth

- Small Combat Unit (SCU) focus and integration of robotic systems to enable small team missions
- An integrated modular combat ensemble with significant weight reduction
- JTRS CL 5 digital networking radio
- Networked lethality and networked fires both within the SCU and from UA and other external assets; cooperative engagement within the SCU
- FCS compatibility/interoperability
- Embedded training

Ground Soldier Spiral Strategy

FCS Spirals FY06 FY08 FY10 FY12 FY14

GSS FY05 FY06 FY08 FY10 FY12 FY14

- - Current Force - - - - Future Force - -

Dismounted Battle Command System (DBCS)	Land Warrior	Ground Soldier System (-)	Ground Soldier System (T)	Ground Soldier System (O)
Commanders Digital Assistant (CDA)				
Spiral #0	Spiral #1	Spiral #2	Spiral #3	Spiral #4
• Commanders Digital Assistant • MicroLight Enhanced Position Location System	• Stryker Integration • Tactical Internet Connectivity • Vehicle-based Battery Recharging • UoA Experimental Force	• Soldier Architecture • Increase Mission Effectiveness • Decreased Weight • Future Combat System Compatibility	• Soldier Architecture • Increase Mission Effectiveness • Decreased Weight • Future Combat System Compatibility	• Integrated w/ Platforms • 50# Fighting Load

Technology Insertion and Complementary Systems

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Science & Technology Future Force Warrior

Acquisition Program Metrics

Evolutionary Acquisition Approach with Revolutionary Technology

FFW Transition Deliverables

- ***Prototype System of Systems HW/SW @ TRL 6***
- ***Operational, system, technical architectures***
- ***Technical data and analyses***
- ***M&S/instrumentation upgrades***
- ***TTPs/Training Programs of Instruction (POIs)***
- ***New/revised methodologies (e.g. quantification of SA on small unit effectiveness)***

Summary

FFW helps transform *OPERATIONAL EFFECTIVENESS* by holistically improving the lethality, survivability, mobility, situational awareness and sustainability of the *Soldier* and small combat unit at a system level within the *Future Force*